The Joint Effect of Narrative Structure, Medium Interactivity, and Readability on Investors' Investment Decisions

Hun-Tong Tan
Nanyang Technological University
Nanyang Avenue, Singapore 639798

ahttan@ntu.edu.sg

Tu Xu
University of Hawaii at Manoa
2404 Maile Way, Honolulu, HI 96822, USA

tx@hawaii.edu

November 2018

Preliminary: Please do not cite without permission.

The Joint Effect of Narrative Structure, Medium Interactivity, and Readability on Investors' Investment Decisions

ABSTRACT

We conduct an experiment to investigate how narrative structure (the extent to which good news is dispersed), the interactivity of disclosure medium (interactive versus non-interactive), and readability (high versus low) jointly influence investors' investment decisions. We find that a disclosure with good news that is more dispersed leads to a higher investment amount. This narrative-structure effect is evident when a disclosure is easy to read and non-interactive or when it is hard to read and interactive. This effect disappears when a disclosure is hard to read and non-interactive or when it is easy to read and interactive. Our study extends accounting literature by showing how interactivity and readability moderate the narrative-structure effect and how readability moderates the interactivity effect. Our findings suggest that managers' discretions over narrative structure should be constrained and that high readability is essential for interactivity to benefit investors.

Keywords: *narrative structure; interactivity; readability; investor judgment and decision-making*

Data Availability: *Contact the authors.*

I. INTRODUCTION

Managers provide a narrative about firm performance when making a financial disclosure, and they have significant discretion over how to tell this narrative (Sedor 2002). For example, they may vary the linguistic style, user interface, and content of their disclosures. Technological advancements also provide managers with more flexibilities in how to present their disclosures (Miller and Skinner 2015). In this study, we examine how three disclosure choices of managers jointly influence investors' investment decisions. These disclosure choices are narrative structure, medium interactivity, and readability.

Disclosed firm performance commonly includes some good news and some bad news. Managers can decide on the narrative structure of its disclosures, such as the placement of the good news versus the bad news within a given disclosure. For example, they may choose to spread the good news over multiple sections of the disclosure or group the good news together. There is indeed a variation in how managers place good versus bad news their communications to the market, and their narrative-structure choices appear to be strategic (Allee and DeAngelis 2015; Boudt and Thewissen 2018). Importantly, investors are swayed by managers' narrative-structure strategies (Allee and DeAngelis 2015). Therefore, understanding the effect of narrative structure on investors' decision-making and identifying the factors that moderate this effect will help to improve investors' welfare.

Studying the effect of medium interactivity is important because the U.S. Securities and Exchange Commission (SEC) has been promoting interactive presentations of financial

information since 2005 (SEC 2008). Consistent with this initiative, the SEC's EDGAR website presents information in an interactive manner. Interactive presentations of financial information are also increasingly popular on firms' own websites (See Appendix A for an example of an interactive earnings release from Microsoft and an example of a non-interactive earnings release from IBM). Both the SEC and the early adopters of interactive disclosures seem to hold the view that interactive presentations improve the transparency of financial reporting (Lin 2015; SEC 2008). While their intention is good, whether interactivity indeed achieves what it is purported to achieve remains largely unclear. Moreover, whether managers' concurrent disclosure choices affect the efficacy of interactive presentations is unknown.

Relative to narrative structure and medium interactivity, readability has received more attention from regulators and researchers. The SEC's Plain English Handbook (1998) provides guidance on why and how to improve the readability of financial disclosures. Researchers have hypothesized that managers vary readability to deter investors' understanding of financial disclosures when they are incentivized to do so (Bloomfield 2008; Li 2008). The maintained assumption behind the SEC's promotion of readable disclosures and researchers' obfuscation hypothesis is that high readability unequivocally improves investors' decision-making. However, theory suggests that this assumption may not hold as other disclosure choices that are concurrently considered by managers may alter any benefits from high-readability disclosures. Examining the moderating roles of interactivity and narrative structure will provide a fuller picture of how readability shapes investors' decision-making.

We develop theory that explains how investors reading management disclosures that vary in narrative structures and in readability make systematically different investment judgments depending on whether the disclosure platform is interactive. Given good news,[1] a narrative structure that disperses the news over different sections of the disclosure rather than concentrates them in one section is expected to lead to more positive investment-related judgments, following the tenets in mental accounting (Thaler 1985, 1999). This narrative-structure effect is more likely to occur when investors process the disclosure less carefully, according to the dual-process model of information processing (Chaiken 1980; Chaiken, Liberman, and Eagly 1989; Petty and Cacioppo 1986).

Our baseline condition is the non-interactive easy-to-read disclosure where investors can read through the disclosure without spending extra effort—investors simply follow the pre-determined flow of information, and the underlying message is easy to understand. In this condition, we expect narrative structure to affect investors' judgment given the ease of processing. We further expect that interactivity and low readability individually prompts investors to process information more carefully. Interactivity does so by giving investors control over information flow and motivating investors' involvement in information processing (Ariely 2000; Biocca 2002; Wojdynski 2014; Xu and Sundar 2016), whereas low readability (as opposed to high readability) does so by creating a

[1] We focus on the dispersion of good news rather than bad news in this study because managers are incentivized to disperse good news but not bad news (Allee and DeAngelis 2015). Theory suggests that dispersing bad news will worsen perceived firm performance, and this consequence is usually inconsistent with managers' preferences. Examining the dispersion of good news thus has more practical relevance than examining the dispersion of bad news, although our theory predicts that the effect of good-news dispersion and that of bad-news dispersion will be symmetrical.

feeling of disfluency (Alter, Oppenheimer, Epley, and Eyre 2007). Accordingly, we expect the narrative-structure effect to be mitigated when the disclosure is interactive or when readability is low. While interactivity and low readability are expected to lessen the narrative-structure effect individually, their combination is not expected to produce a similar effect because simultaneously processing and controlling hard-to-read information demands substantial cognitive resources. When the availability of cognitive resources is low, individuals tend to process information superficially (Lang 2000; Shiv and Fedorikhin 1999, 2002). As a result, the narrative-structure effect will revive when a disclosure is both interactive and hard to read.

We conduct an experiment to examine our research question. An experiment enables us to keep information content constant while altering multiple disclosure choices at the same time. In an archival dataset, variations in narrative structure or readability can imply an underlying variation in firm fundamentals (Allee and DeAngelis 2015). Firms that adopt interactive interfaces for their disclosures may also differ systematically from those that do not. Therefore, it would be difficult to archivally isolate the effects of disclosure choices from the effects of firm characteristics. Moreover, the commonly used bag-of-words approaches in archival studies rely on word tones to proxy for news valence (Allee and DeAngelis 2015). Because the same message can be expressed in words of different tones when framed differently, such approaches do not allow researchers to disentangle narrative-structure effects from language-framing effects. By holding constant firm characteristics, information content, and language framing, our experiment is designed to provide causal evidence on the effects of disclosure choices.

We test our research question in a 2 × 2 × 2 between-participants experiment with narrative structure, medium interactivity, and readability as independent variables. We manipulate narrative structure by varying the placement of good versus bad news in an earnings release while holding total news constant. In the good-news-dispersed (-condensed) condition, the pieces of good news are spread out in multiple sections (concentrated in one section) of the earnings release. We manipulate medium interactivity by varying whether the earnings release is presented in a linear-article mode or an interactive multi-tab mode. To manipulate readability, we present the earnings release in a table/bullet style in the high-readability condition and in a paragraph style in the low-readability condition. Investor participants are instructed to provide an amount that they would like to invest in the hypothetical company that provides the earnings release.

Consistent with our predictions, we find that, when readability is high, investors invest more when good news is more dispersed, and that this effect is evident only when the disclosure is *non-interactive* but not when it is *interactive*. This result suggests that, when a disclosure is easy to read, investors' investment decisions are influenced by narrative-structure strategies, and that medium interactivity mitigates this influence. In contrast, when readability is low, investors invest more when good news is more dispersed only when the disclosure is *interactive* but not when it is *non-interactive*. This result suggests that low readability curtails the influence of narrative structure, but only when the disclosure is *non-interactive*.

Our study contributes to the accounting literature on linguistic effects in several ways. First, our study extends the literature on narrative structure (Allee and DeAngelis 2015; Boudt and

Thewissen 2018) by documenting moderators of the narrative-structure effect. Specifically, Allee and DeAngelis (2015) show that dispersion of good news (proxied by dispersion of positive-tone words) in conference calls leads to a more positive market reaction on average, while we show that dispersion of good news will not influence investors' decision-making when a disclosure is interactive and easy to read *or* when it is non-interactive and hard to read. These boundary conditions reflect common practices (Li 2008).

Second, our study extends the literature on readability. Prior studies provide evidence that high readability benefits investors by reducing their susceptibility to the influences of other disclosure choices such as language sentiment and benchmark consistency (Tan, Wang, and Zhou 2014, 2015). Our finding provides an exception in that low readability, instead of high readability, mitigates the influence of narrative structure on investors' decision-making. Moreover, participants in the prior studies of this literature play a passive role in information processing, meaning that they do not interact with the information. It is unclear how readability will shape investors' decisions when investors have an active control of information as they often do in real life. Our study fills this gap by showing that high readability is more important to investors' decision-making when disclosure is interactive rather than non-interactive.

Last but not least, our study contributes to the nascent accounting literature on medium interactivity. Grant (2017) examines the joint effect of medium interactivity and screen size, and finds that medium interactivity improves (impairs) investors' information integration when screen size is large (small). Since the screen sizes of investors' devices are typically out of managers'

control, Grant (2017) does not examine whether the effect of interactivity depends on the other disclosure choices simultaneously considered by managers. It is important to examine this issue because strategic managers may employ disclosure choices (e.g., low readability) that offset the impact of interactivity while maintaining the ostensible reporting transparency portrayed by the provision of interactivity. Our study extends Grant (2017) by showing that low readability negates the effect of interactivity, and that interactivity, together with readability, determines the effect of narrative structure.

Our findings have important practical implications. First, our findings suggest that individual investors' investment decisions are causally influenced by managers' narrative-structure strategies. Regulators, who are interested in improving investors' welfare, may consider limiting the flexibilities that managers have in structuring narratives. Second, the SEC and prior research advocate that high readability and interactive interfaces enhance the transparency of financial reporting. Our study highlights the importance of considering their interactive effects. Specifically, our findings suggest that interactive interfaces should be cautiously promoted when high readability cannot be ensured.

In the next section, we develop our hypotheses. Section III describes our experimental design. Section IV presents our results. Finally, we conclude this paper in Section V.

II. THEORY AND HYPOTHESES DEVELOPMENT

Narrative structure

Consider a disclosure with nine pieces of news, three of them good, and the remaining six bad. The placements of the good and the bad news are varied such that the three pieces of good news are placed close to each other or far from each other. The placements of the news items determine the structure of the disclosure narrative. In practice, a variation in the narrative structures of financial disclosures reflects a natural variation in underlying economics, a variation in managers' deliberate choices, or both. Research about the narrative structures of financial disclosures is limited.

In an archival study, Allee and DeAngelis (2015) show that managers spread positive-tone words more in conference calls when they have a stronger incentive to manage market perceptions. Narrative-structure choices are also shown to be associated with other strategic disclosure choices such as classification shifting, suggesting that managers consider multiple disclosure choices at the same time. Moreover, the market reacts to narrative structures in a way that appears to be consistent with managers' preferred outcomes. Similarly, Boudt and Thewissen (2018) find that CEOs tend to disperse positive words in their letters to shareholders as an impression management tool.

While these archival studies show that narrative-structure choices are associated with market reactions, they are challenged to identify a causal effect of narrative structure on market participants' reactions. For example, Allee and DeAngelis (2015, 268) acknowledge that "the dispersion of tone within disclosure narratives does not directly identify positive or negative news items a firm discusses." Since managers often manipulate language framing (Huang, Teoh, and

Zhang 2014), it would be difficult to archivally disentangle the effect of narrative structure from the effect of tone management. In addition, firm characteristics and the information content of disclosures co-vary with narrative structures in a natural setting (Allee and DeAngelis 2015), potentially confounding the effect of narrative structures. Our study complements prior archival work by testing the narrative-structure effect in an experiment that manipulates narrative structures precisely and controls for the potential confounding factors. More importantly, our setting allows us to explore the moderators of the narrative-structure effect.

Mental accounting (Thaler 1985, 1999), along with prospect theory (Kahneman and Tversky 1979), suggests that when gain or loss is disaggregated, its impact is stronger than when it is aggregated. For example, two gains of $1 each will bring more utilities than a single gain of $2. This theory has been applied to accounting settings. For example, Bonner et al. (2014) show that investors' valuation judgments are affected by whether gains and losses are disaggregated on the income statement even when investors have perfect information about these gains and losses individually.

Although the good (bad) news of the firms that investors are evaluating does not necessarily imply personal gains (losses) to the investors, if we assume that investors' expected utility is higher when firms perform well and lower when firms perform poorly, the tenets of mental accounting could apply. Consistent with this logic, Libby and Tan (1999) show that analysts make significantly lower earnings estimates when they read a bad-news earnings release that follows an earnings

warning than one that does not follow an earnings warning or one that concurs with an earnings warning.

When good news is more dispersed, more sections of the disclosure contain good news. The tenets of mental accounting suggest that a disclosure with dispersed good news will be perceived more positively than an otherwise identical disclosure with condensed good news. This is because investors are expected to keep a separate mental account for each section of the disclosure, and as good news is spread out, more mental accounts contain good news. When more mental accounts contain good news, investors in turn perceive that the overall performance news is more favorable. This is our theoretical basis for the narrative-structure effect; we discuss how this effect is moderated by interactivity and readability next.

Interactivity, readability, and information processing

The dual-process model of information processing suggests two possible routes to information processing (Chaiken 1980; Chaiken et al. 1989; Petty and Cacioppo 1986). One is more effortful and analytical, commonly referred to as systematic processing in the literature. The other is more automatic and superficial, commonly referred to as heuristic processing. When individuals process information systematically, relative to heuristically, their judgments are less likely to be influenced by superficial features of information such as tone, formatting, and narrative structure. Instead, their judgments will be determined by information content. As a result, individuals will make fewer judgment errors when engaging in systematic processing, relative to heuristic processing. However, heuristic processing is usually the default mode of processing, and systematic processing needs to

be prompted. Building on prior research, we posit that both medium interactivity and low readability can prompt systematic processing. We first discuss the impact of interactivity on investor judgment.

In a traditional non-interactive interface, the text of a disclosure is presented in a linear form where investors progress the text from the top to the bottom. In contrast, when information is presented interactively, investors can read the disclosure in a non-linear fashion and easily navigate across different sections of the disclosure. In other words, an interactive disclosure permits investors to control the information flow, and investors' interests dictate their reading paths.

Prior research about the interactive interfaces of media and websites suggests that when decision-makers are allowed to control information flow, they are more involved in information processing (Kuang and Cho 2016). An interactive narrative creates a more immersive narrative experience than a non-interactive narrative as more senses are activated when readers interact with the narrative (Biocca 2002). As a result, individuals perform better in judgment tasks (Xu and Sundar 2016). For example, consumers can better differentiate products of different levels of quality when the specifications of the products are presented interactively rather than non-interactively (Ariely 2000). These findings suggest that the control of information flow can prompt systematic processing. Based on the dual-process model of information processing, we posit that an interactive interface will mitigate the extent to which investors' judgments are influenced by narrative structure.

Moving on to readability, we posit that low readability, rather than high readability, can prompt systematic processing. When a message is hard to read, decision-makers experience a level of difficulty or disfluency when processing the message (Novemsky, Dhar, Schwarz, and Simonson 2007; Reber, Winkielman, and Schwarz 1998). This experience forces decision-makers to slow down their reading and process the message more carefully. For instance, prior research shows that individuals process the information shown in a hard-to-read font more carefully and make fewer judgment errors than when they process the identical information shown in an easy-to-read font (Alter et al. 2007). Therefore, low readability, like interactivity, will also mitigate the influence of narrative structure.

Because interactivity and low readability will individually activate systematic processing and mitigate the potential impact of narrative structure, it is reasonable to assume that their joint effect will be additive. However, theory suggests that their joint effect may actually be weaker than their individual effects. This is because controlling information flow is a cognitive task in itself, consuming cognitive resources (Foltz 1996). The limited capacity model of mediated message processing suggests that individuals' cognitive resources are limited, and that when these resources are depleted, individuals are unable to process information optimally (Lang 2000). Consistent with this model, prior research finds that individuals rely on automatic, as opposed to controlled, cognitive processes to make decisions under high cognitive load. For example, when consumers are more mentally preoccupied, they are more likely to choose the alternative that is superior on the affective dimension but inferior on the cognitive dimension (Shiv and Fedorikhin 1999, 2002).

Additionally, website users' task performances deteriorate when a website has a large number of interactive components (Xu and Sundar 2016). Since significant cognitive resources are required to both process a hard-to-read message and do so interactively, we expect that investors will process a disclosure heuristically when the disclosure is both hard to read and in an interactive mode.

Our discussion above suggests that when readability is high, investors will process a disclosure heuristically by default. In this baseline condition, a disclosure with good news that is more dispersed will leave a more positive impression of firm performance on investors according to the theory of mental accounting. When investors have a more favorable impression of the firm performance described in the disclosure, they will invest more in the firm that provides the financial disclosure. However, this narrative-structure effect will be mitigated by interactivity because the control of information flow engages investors and prompts them to process the disclosure systematically. Accordingly, we propose the following hypothesis, the prediction of which is illustrated in Panel A of Figure 1.

> **H1:** *When readability is high, investors will invest more when good news is more dispersed than when good news is more condensed and disclosed in a non-interactive mode; this simple main effect of dispersion will be smaller when the disclosure is made in an interactive mode.*

When readability is low, the experience of processing difficulty can activate systematic processing. However, with an interactive platform, the need to control information flow consumes more cognitive resources, adding to that required to process the low-readability disclosure.

Systematic processing is less likely now, and investors default back to heuristic processing. As a result, narrative structure is expected to affect investor judgment when a disclosure is both interactive and hard to read. In contrast, with a non-interactive platform, investors will have more cognitive resources left to process the low-readability disclosure carefully. As a result, their judgments are less likely to be affected by narrative structure. Our second hypothesis, illustrated in Panel B of Figure 1, is the following.

> **H2:** *When readability is low, investors will invest more when good news is more dispersed than when good news is more condensed and disclosed in an interactive mode; this simple main effect of dispersion will be smaller when the disclosure is made in a non-interactive mode.*

(Please insert Figure 1 about here)

III. EXPERIMENT

Design

Our experiment employs a 2 × 2 × 2 between-participants design, manipulating narrative structure, medium interactivity, and readability. Participants read an excerpt of a hypothetical company's recent earnings release. The first manipulated variable is narrative structure (good-news dispersed versus good-news condensed). In all conditions, there are nine pieces of news concerning the quarterly changes in earnings with respect to nine segments of the company. We give abstract names to the segments (e.g., Business A, Region 1) to minimize possible influences of participants' innate preferences for certain business lines or geographic areas. Out of the nine

pieces of performance news, three imply positive performance changes (i.e. good news) and six imply negative performance changes (i.e. bad news). In the good-news-dispersed condition, the three pieces of good news are spread out over the three main sections of the release, whereas in the good-news-condensed condition, the three pieces of good news are located together within the first main section of the release. The placements of the bad news vary correspondingly with the placements of the good news.[2]

The second manipulated variable is the interactivity of disclosure medium (interactive versus non-interactive). In the interactive condition, the release is split into tabs, and participants can click on different tabs to read the release in the order of their preferences. In the non-interactive condition, the release is presented in a continuous-article style.

The third manipulated variable is readability. In the high-readability condition, the release is presented in a table/bullet format, and the directional changes in earnings are indicated with arrows. In the low-readability condition, the release is written in a paragraph format, and the directional changes in earnings are expressed in words. This manipulation is consistent with Tan et al. (2014). Total information is held constant across conditions.[3] Appendix B illustrates our manipulations.

[2] In the good-news-condensed condition, we place the three pieces of good news together within the first main section of the release. This design helps to eliminate an alternative explanation to the dispersion effect that participants miss the good news in the good-news-condensed condition when the good news is not placed at the top of the release. With our current design, if participants fail to read through the disclosure, then they will see more pieces of good news in the good-news-condensed condition than in the good-news-dispersed condition. This may lead to a more favorable reaction to the information in the good-news-condensed condition than to the information in the good-news-dispersed condition, biasing against us finding our expected results.

[3] To keep information constant, we also manipulate the organization of segment results at two levels. At one level, the segment result is organized by business segment, and at the other level, it is organized by geographic location. This variable does not interact with our main independent variables ($p = 0.384$), and including this variable as a covariate in our analyses does not change our results.

Participants

Three hundred and fourteen Amazon Mechanical Turk workers participate in our experiment for a compensation of $2. We require participants to be native English speakers who have invested in the stock market at least three times, received a bachelor's degree or higher, and taken at least two accounting courses and one finance course. Moreover, we ask about the frequency they invest in shares on an 11-point scale ranging from -5 (not frequently) to 5 (very frequently). Only the workers who indicate a positive value on this scale can proceed to the experiment. These requirements ensure that our participants are reasonable proxies for informed investors.

Results of our post-experimental demographic questionnaire show that our participants have approximately 15 years of work experience and 10 years of stock-market-investment experience on average. They have also taken approximately five accounting courses and four finance courses. Moreover, they report being familiar with earnings announcements (mean = 7.392), interactive websites (mean = 8.586), and companies' interactive financial disclosures (mean = 6.892), all measured on an 11-point scale with endpoints 1 (extremely unfamiliar) and 11 (extremely familiar).

Procedure

We ask participants to assume the role of an investor. Participants begin the experiment by reading a general introduction to a hypothetical company (RC Inc.) and its historical financial information. Then they are asked to access an excerpt of the company's most recent earnings release, which reports segment performances and contains our manipulations. This earnings release, which is based on actual earnings releases of listed companies in the U.S., is hyperlinked

to another website in all conditions. In this way, information acquisition cost is held constant across conditions. To ensure that participants click the link to the earnings release and read the earnings release, our online instrument does not allow participants to proceed to the next step (i.e., responding to the dependent measures) within 30 seconds of the appearance of the link. After reading the earnings release, participants are instructed to respond to our dependent measures, manipulation checks, process measures, and demographic questions. We capture investors' investment decisions by asking participants to assume that they have received a $10,000 cash inheritance from a distant relative and to specify the amount of money (out of $10,000) that they would invest in the company.

IV. Results

Manipulation checks

After responding to the dependent measures, participants are asked to answer our manipulation-check questions. To check the manipulation of narrative structure, we ask participants about the distribution of news in the earnings release. There are two options. One is, "one segment had all the good news in the earnings release (i.e., one segment reported good news exclusively, whereas the other segments reported bad news exclusively)." The other is, "each segment had mixed news (i.e., each segment reported some good news and some bad news, and no single segment reported good news or bad news exclusively)." Seventy-one percent of the participants answer this question correctly. As a check on the manipulation of medium interactivity,

we ask participants to indicate whether the earnings release was presented in a continuous format (where they could not choose which segment to view first) or an interactive clickable interface (where they could choose which segment to view first). Eighty-four percent of the participants answer this question correctly.

Finally, we ask participants to evaluate the extent to which they think the earnings release is difficult to read/understand/process on an 11-point scale, with endpoints 1 = "not at all difficult" and 11 = "extremely difficult." We take the average of these three measures. The mean rating of 4.004 in the low-readability condition is significantly higher than the mean rating of 3.510 in the high-readability condition ($p = 0.035$, one-tailed; untabulated).[4] Because a higher rating implies more difficult to read, this result suggests that readability is indeed lower in the low-readability condition than the high-readability condition. Therefore, we conclude that our manipulation of readability is successful. We include all participants in our analyses and obtain similar results when excluding those who fail the manipulation checks.

Hypotheses testing

All participants

H1 and H2 collectively predict a three-way interaction effect among narrative structure, interactivity, and readability. Accordingly, we conduct a three-way analysis of variance (ANOVA) on these independent variables with investment amount as the dependent variable. The descriptive

[4] All p-values are two-tailed unless otherwise stated.

statistics are presented in Table 1, Panel A. The ANOVA results in Panel B of Table 1 show a significant three-way interaction effect (p = 0.050, one-tailed equivalent) as predicted. Additionally, investment amount is higher on average when good-news is dispersed than condensed (means: 3191.439 for dispersed versus 2713.573 for condensed; p = 0.059), consistent with the theory of mental accounting and the archival finding of Allee and DeAngelis (2015). There is no main effect of readability or interactivity. Next, we test H1 and H2 individually.

(Please insert Table 1 about here)

High-readability condition (test of H1)

H1 indicates that when readability is high, investors will invest more when good news is more dispersed than when it is more condensed and disclosed in a non-interactive mode; this simple main effect of dispersion will be smaller when the disclosure is made in an interactive mode. Descriptive statistics are presented in Panel A of Table 2 and depicted in Figure 2. As H1 predicts an ordinal interaction, we conduct a contrast-coded ANOVA as recommended by Buckless and Ravenscroft (1990) and Guggenmos, Piercey, and Agoglia (2018). Following H1, we specify a contrast weight of −3 for the condition of good-news condensed / non-interactive, -1 for the condition of good-news condensed / interactive, +1 for the condition of good-news dispersed / interactive, and +3 for the condition of good-news dispersed / non-interactive. As shown in Panel B of Table 2, this contrast is significant (p = 0.035, one-tailed equivalent), and the residual between-cells variance is not (p = 0.938). Therefore, the data fit our hypothesized pattern of results.

Results of simple main effect tests (see Panel C of Table 2) further show that, when disclosure is made in a non-interactive mode, participants' investment amount is significantly higher when good news is more dispersed than more condensed (means: 3435.342 for dispersed versus 2543.026 for condensed; p = 0.042, one-tailed). In contrast, there is no difference in participants' investment amount between the good-news-dispersed and the good-news-condensed conditions when disclosure is made in an interactive mode (means: 3246.175 for dispersed versus 2976.200 for condensed; p = 0.592), suggesting a boundary condition of the narrative-structure effect documented by Allee and DeAngelis (2015). Overall, our results support H1.

(Please insert Table 2 about here)

(Please insert Figure 2 about here)

Low-readability condition (test of H2)

H2 indicates that when readability is low, investors will invest more when good news is more dispersed than when good news is more condensed and disclosed in an interactive mode; this simple main effect of dispersion will be smaller when the disclosure is made in a non-interactive mode. Descriptive statistics are presented in Panel A of Table 3 and depicted in Figure 3. As H2 also predicts an ordinal interaction, we conduct a contrast-coded ANOVA as we do for H1. Following H2, we specify a contrast weight of −3 for the condition of good-news condensed / interactive, -1 for the condition of good-news condensed / non-interactive, +1 for the condition of good-news dispersed / non-interactive, and +3 for the condition of good-news dispersed / interactive. As shown in Panel B of Table 3, this contrast is significant (p = 0.052, one-tailed

equivalent), and the residual between-cells variance is not ($p = 0.461$). Therefore, the data fit our hypothesized pattern of means for H2.

Results of simple main effect tests (see Panel C of Table 3) further show that, when disclosure is made in an interactive mode, participants' investment amount is significantly higher when good news is more dispersed than more condensed (means: 3465.775 for dispersed versus 2556.568 for condensed; $p = 0.040$, one-tailed). In contrast, when disclosure is made in a non-interactive mode, there is no difference in participants' investment amount between the good-news-dispersed and the good-news-condensed conditions (means: 2616.282 for dispersed versus 2761.268 for condensed; $p = 0.774$), suggesting another boundary condition of the narrative-structure effect. Hence, these results support H2.

Recall that we find no simple main effect of narrative structure when disclosure is interactive and readability is high, but a significant simple main effect of narrative structure when disclosure is interactive and readability is low. The difference in results suggests that the effect of interactivity on investors' decision-making is muted when readability is low. This is an important boundary condition of the interactivity effect because low-readability disclosures are common in practice (Li 2008). In addition, for non-interactive disclosures, we find a significant simple main effect of narrative structure when readability is high but not when readability is low. These results suggest that although low readability can be a concern, there is a silver lining in that lower readability, when not combined with enabling interactivity, can mitigate the narrative-structure effect.[5]

[5] We also measure participants' judgments about the company's earnings potential, stock-price-increase potential, and

(Please insert Table 3 about here)

(Please insert Figure 3 about here)

Cognitive process

Processing modes

Our theory posits that interactivity prompts systematic processing when readability is high, and that low readability prompts systematic processing when information is presented in a non-interactive mode. Moreover, the combination of interactivity and low readability leads to heuristic processing, relative to interactivity or low readability alone. To provide evidence on participants' processing modes, we analyze the time they spend on reading the earnings release. Systematic processing is more effortful than heuristic processing (Chaiken 1980; Chaiken et al. 1989; Petty and Cacioppo 1986), and a longer reading time would suggest a greater extent of systematic processing.

We conduct a 2 × 2 ANOVA with interactivity and readability as the independent variables and the number of seconds participants spend on reading the earnings release as the dependent variable.[6] Panel A of Table 4 presents the descriptive statistics of this analysis, and Figure 4 depicts

attractiveness as an investment on 11-points scales. We find similar results on a factor that consists of these three questions as on investment amount for H1, but not for H2. We do not find a significant three-way interaction effect with this factor due to the lack of statistical power (power = 0.077, lower than the threshold for an adequate power of 0.8; see Cohen 1992, and Bakker, Hartgerink, Wiherts, and van der Maas 2016 for discussions).

[6] We exclude an observation from this analysis because this outlier is more than 16 standard deviations above the overall mean. This is the only observation that is farther than five standard deviations from the mean.

the pattern of results. As shown in Panel B of Table 4, there is a significant two-way interaction effect between interactivity and readability ($p = 0.042$).

Given this interaction effect, we rely on simple main effects to test our theory (see Panel C of Table 4). Consistent with our theory, we find that participants spend more time reading the earnings release in the interactive condition than in the non-interactive condition when readability is high (means: 88.513 for interactive versus 59.100 for non-interactive; $p = 0.042$, one-tailed). This result suggests that interactivity prompts systematic processing when readability is high. We also find that participants spend more time reading the low-readability earnings release than the high-readability earnings release when the release is presented in a non-interactive mode (means: 88.942 for low readability versus 59.100 for high readability; $p = 0.040$, one-tailed). This result suggests that low readability prompts systematic processing when information is presented non-interactively.

Finally, the remaining simple main effect results in Panel C of Table 4 show that reading time is directionally lower in the interactive condition than in the non-interactive condition when readability is low ($p = 0.136$, one-tailed). Similarly, reading time is directionally lower in the low-readability condition than in the high-readability condition when disclosure is interactive ($p = 0.128$, one-tailed). This result provides some evidence for our theory that investors tend to process low-readability information heuristically when preoccupied cognitively by interacting with the information. Combined, our findings suggest that investors process information systematically when information is either interactive or hard to read, but not both.

(Please insert Table 4 about here)

(Please insert Figure 4 about here)

Information control

We posit that an interactive interface engages investors in controlling the information. We test this theory here. Following a prior study (Liu 2003), we measure perceived information control with a four-item questionnaire. Specifically, we ask participants to indicate the extent to which they agree with the following statements on a seven-point scale: (a) "I felt that I had a lot of control over my visiting experience at website of the earnings release;" (b) "[w]hale I was on the website of the earnings release, I could choose freely what I wanted to see;" (c) "[w]hile surfing the website of the earnings release, I had absolutely no control over what I can do on the site" (coded reversely); (d) "[w]hile surfing the website of the earnings release, my actions decided the kind of experience I got." A factor analysis confirms that these items capture the same construct (the highest eigenvalue is 2.829, followed by 0.638). Therefore, we collapse these items and use the extracted factor as our measure of perceived information control.

An ANOVA with interactivity as the independent variable and perceived information control as the dependent variable shows a main effect of interactivity in the predicted direction, suggesting that participants' feeling of information control is significantly stronger in the interactive condition than in the non-interactive condition (means: 0.497 for interactive versus -0.497 for non-interactive; $p < 0.001$; untabulated). The role that perceived information control plays in explaining the

interactivity effects, while studied in marketing and communications literature, has not been documented by existing accounting literature. It is thus one of our contributions to the accounting literature.[7]

Disfluency effects of low readability

We posit that when disclosures are non-interactive, low readability prompts systematic processing as it creates a feeling of disfluency. To test our theory, we rely on three measures of our post-experimental questionnaire. First, prior studies on disfluency effects (e.g., Alter et al. 2007) show that the feeling of disfluency weakens individuals' confidence in the accuracy of their judgements. Following this research, we capture participants' confidence in judgment by asking, on an 11-point scale with endpoints 1 = "not at all confident" and 11 = "very confident," "[h]ow confident are you in your investment and earnings judgments?" Consistent with prior findings, we

[7] We also measure participants' involvement in processing the information. Employing an established involvement inventory in the psychology literature (Wojdynski 2014; Zaichkowsky 1985), we ask participants to respond to the following nine items on a seven-point scale. The information in the earnings release: (a) matters to me/doesn't matter to me; (b) is relevant to me/is irrelevant to me; (c) is unimportant/important; (d) is essential/non-essential; (e) is wanted/unwanted; (f) is mundane/fascinating; (g) is beneficial/not beneficial; (h) is significant/insignificant; (i) is of concern to me/of no concern to me. A factor analysis confirms that these items capture the same construct (the highest eigenvalue is 5.942, followed by 0.769). Therefore, we collapse these items and use the extracted factor as our measure of involvement. Regression analyses show a significant positive association between involvement and reading time (coefficient = 0.123, $p = 0.029$) as well as a significant positive association between involvement and perceived information control (coefficient = 0.295, $p < 0.001$). The former association is consistent with prior psychology research indicating that individuals process information more systematically when involvement in higher (Petty, Cacioppo, and Schumann 1983). The latter association is consistent with prior psychology research indicating that information control motivates involvement (Ariely 2000; Wojdynski 2014). These results provide support for our theory.

find that participants are less confident about their judgments in the low-readability condition than in the high-readability condition when the disclosure is non-interactive (means: 7.463 for low readability versus 7.883 for high readability; $p = 0.084$, one-tailed).

Second, prior research (Rennekamp 2012) suggests that readability and fluency are positively associated with reliance on disclosure. Accordingly, we examine participants' reliance on disclosure. Specifically, we ask participants to indicate, on an 11-point scale with endpoints 1 = "completely disagree" and 11 = "completely agree," "[t]o what extent do you agree that you can rely on the information in the earnings release?" We find that participants rely less on the low-readability disclosure than on the high-readability disclosure when the disclosure is non-interactive (means: 7.413 for low readability versus 7.844 for high readability; $p = 0.078$, one-tailed).

Third, we ask, on an 11-point scale with endpoints 1 = "completely disagree" and 11 = "completely agree," "[t]o what extent do you think the earnings release is clear?" Not surprisingly, we find that participants perceive the earnings release to be less clear in the low-readability condition than in the high-readability condition when the disclosure is non-interactive (means: 7.888 for low readability versus 8.403 for high readability; $p = 0.085$, one-tailed).

There are no effects of readability on any of the three measures when the disclosure is interactive ($p > 0.214$). Taken together, these results provide support for our theory that investors' judgments are influenced by the feeling of disfluency when a disclosure is non-interactive and hard to read.

Ruling out an alternative theory for the effect of readability

We posit that for non-interactive disclosures, investors process information less systematically, and thus their judgments are more influenced by narrative structure, when readability is high than low. An alternative account for the readability effect is that investors are better able to acquire and encode the good news that is dispersed in disclosures when readability is high than low. Should this alternatively account hold, we would find that participants recall more pieces of good news shown in the good-news dispersed condition when readability is high than low.

To rule out this alternative account, we rely on a recall question that we ask in the post-experimental questionnaire. Specifically, we ask, "how many pieces of good news about the company were there in the earnings release?" Untabulated results show no interaction effect between readability and narrative structure when the disclosure is non-interactive or interactive ($p > 0.438$). Moreover, participants recall no more pieces of good news in the high-readability condition than in the low-readability condition when the disclosure is non-interactive and good news is dispersed ($p = 0.452$).[8] This result, together with the result on reading time, provides support for our dual-process-model-based theory instead of the alternative theory.

V. CONCLUSION

[8] We also conduct an ANOVA with narrative structure, medium interactivity, and readability as the independent variables and the quantity of good news recalled as the dependent variable. We find a main effect of narrative structure ($p = 0.036$, one-tailed) in that participants recall more pieces of good news when good news is dispersed than condensed. No other main effects or interaction effects are significant ($p > 0.210$).

We conduct an experiment to investigate how narrative structure, the interactivity of disclosure medium, and readability jointly affect investors' investment decisions. Holding information content constant across experimental conditions, we show that investors invest more in response to an earnings release with dispersed good news than to an otherwise identical earnings release with condensed good news, and that this narrative-structure effect is moderated by readability and medium interactivity.

Our study contributes to the accounting literature in a number of ways. Prior research examines the effect of narrative structure on market reactions to firm communications (Allee and DeAngelis 2015). We extend this work by showing that the narrative-structure effect disappears when a textual disclosure is either interactive or hard to read. These boundary conditions have not been established before. Our study also contributes to the literature on interactivity (Grant 2017) by showing that the effect of interactivity hinges on readability. Interactivity amplifies the influence of narrative structure on investor judgment when readability is low. This finding highlights the need to improve readability as interactive disclosures become increasingly popular. In addition, our study contributes to the readability literature by demonstrating an instance where low readability reduces the influence of another strategic reporting choice on investors' decision-making. This result provides a counterexample to the argument that high readability always improves investors' decision-making. On the theoretical level, our study contributes to the psychology literature on the disfluency effect (e.g., Alter et al. 2007) by identifying a moderator to this effect. Specifically, we show that the disfluency effect goes away when information is

presented interactively. This moderator is new to the psychology literature, and it has practical importance.

Several limitations of the study should be noted. First, we provide participants with a short excerpt of an earnings release, when the full earnings releases in practice can be longer. While we believe that the effects that we show are amplified when earnings releases get longer, it is possible that investors get confused or overwhelmed by longer earnings releases, especially when earnings releases are provided on an interactive platform. We encourage future research to investigate this issue. Second, the earnings release in our experiment has a relatively plain presentation, while graphics are increasingly popular in financial reports. Whether and how graphics interact with medium interactivity to influence investor judgment may be a promising area for future research. Lastly, our experimental platform does not permit us to track the movements of participants' cursors or eyes, while these types of movements potentially provide useful information about how participants interact with and process information. Future research may use advanced technologies such as eye-tracking devices to provide further insights into the underlying processes behind the effects we document in this study.

REFERENCES

Allee, K. D., and M. D. DeAngelis. 2015. The structure of voluntary disclosure narratives: Evidence from tone dispersion. *Journal of Accounting Research* 53 (2): 241-274.

Alter, A. L., D. M. Oppenheimer, N. Epley, and R. N. Eyre. 2007. Overcoming intuition: metacognitive difficulty activates analytic reasoning. *Journal of Experimental Psychology: General* 136 (4): 569-576.

Ariely, D. 2000. Controlling the information flow: Effects on consumers' decision-making and preferences. *Journal of Consumer Research* 27 (2): 233-248.

Bakker, M., C. H. Hartgerink, J. M. Wicherts, and H. L. van der Maas. 2016. Researchers' intuitions about power in psychological research. *Psychological Science* 27 (8): 1069-1077.

Biocca, F. 2002. The evolution of interactive media: Toward "being there" in nonlinear narrative worlds, in *Narrative Impact: Social and Cognitive Foundations*, edited by M. C. Green, J. J. Strange, and T. C. Brock. Mahwah, NJ: Lawrence Erlbaum Associates.

Bloomfield, R. 2008. Discussion of: Annual report readability, current earnings, and earnings persistence. *Journal of Accounting and Economics* 45 (August): 248–252.

Bonner, S. E., S. M. Clor-Proell, and L. Koonce. 2014. Mental accounting and disaggregation based on the sign and relative magnitude of income statement items. *The Accounting Review 89* (6): 2087-2114.

Boudt, K., and J. Thewissen. 2018. Jockeying for position in CEO letters: Impression management and sentiment analytics. *Financial Management.* Forthcoming.

Buckless, F. A., and S. P. Ravenscroft. 1990. Contrast coding: A refinement of ANOVA in behavioral analysis. *The Accounting Review* 65 (4): 933-945.

Chaiken, S. 1980. Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology* 39: 752-766.

Chaiken, S., A. Liberman, and A. H. Eagly. 1989. Heuristic and systematic processing within and beyond the persuasion context, in *Unintended Thought*, edited by J. S. Uleman and J.A. Bargh. New York: Guilford Press.

Cohen, J. 1992. A power primer. *Psychological Bulletin* 112 (1): 155-159.

Foltz, P. W. 1996. Comprehension, coherence, and strategies in hypertext and linear text., in *Hypertext and Cognition*, edited by J-F. Rouet, J. J. Levonen, A. Dillon, and R. J. Spiro. Mahwah, NJ: Lawrence Erlbaum Associates.

Grant, S. M. 2017. Information choice within disclosures, mobile devices, and investor judgments. Working paper. University of Washington.

Guggenmos, R., D. Piercey, and C. Agoglia. 2018. Custom Contrast Testing: Current Trends and a New Approach. *The Accounting Review*. Forthcoming.

Huang, X., S. H. Teoh, and Y. Zhang. 2014. Tone management. *The Accounting Review* 89 (3): 1083-1113.

Kahneman, D., and A. Tversky. 1979. Prospect theory: An analysis of decision under risk. *Econometrica* 47 (2): 263-291.

Kuang, K., and H. Cho. 2016. Delivering vaccination messages via interactive channels: examining the interaction among threat, response efficacy, and interactivity in risk communication. *Journal of Risk Research* 19 (4): 476-495.

Lang, A. 2000. The limited capacity model of mediated message processing. *Journal of Communication* 50 (1): 46-70.

Li, F. 2008. Annual report readability, current earnings, and earnings persistence. *Journal of Accounting and Economics* 45 (2-3): 221-247.

Libby, R., and H-T. Tan. 1999. Analysts' reactions to warnings of negative earnings surprises. *Journal of Accounting Research* 37 (2): 415-435.

Lin, K. 'Company Documents Get Graphic to Increase Transparency.' 2015. Available at http://blogs.wsj.com/cfo/2015/08/12/company-documents-get-graphic-to-increase-transparency/.

Liu, Y. 2003. Developing a scale to measure the interactivity of websites. *Journal of Advertising Research* 43 (2): 207-216.

Miller, G. S., and D. J. Skinner 2015. The evolving disclosure landscape: How changes in technology, the media, and capital markets are affecting disclosure. *Journal of Accounting Research* 53 (2): 221-239.

Novemsky, N., R. Dhar, N. Schwarz, and I. Simonson. 2007. Preference fluency in choice. *Journal of Marketing Research* 44 (3): 347-356.

Petty, R. E., and J. T. Cacioppo. 1986. *Communication and Persuasion: Central and Peripheral Routes to Attitude Change.* New York, NY: Springer-Verlag.

Petty, R. E., J. T. Cacioppo, and D. Schumann. 1983. Central and peripheral routes to advertising effectiveness: The moderating role of involvement. *Journal of Consumer Research* 10 (2): 135-146.

Reber, R., P. Winkielman, and N. Schwarz. 1998. Effects of perceptual fluency on affective judgments. *Psychological Science* 9 (1): 45-48.

Securities and Exchange Commission (SEC). 1998. *A Plain English Handbook: How to Create Clear SEC Disclosure.* SEC Office of Investor Education and Assistance. Available at: http://www.sec.gov/pdf/handbook.pdf.

Securities and Exchange Commission (SEC). 2008. Interactive Data to Improve Financial Reporting. Release Nos. 33-8924; 34-57896; 39-2455; IC-28293; File No. S7-11-08, https://www.sec.gov/rules/proposed/2008/33-8924.pdf.

Sedor, L. M. 2002. An explanation for unintentional optimism in analysts' earnings forecasts. *The Accounting Review* 77 (4): 731-753.

Shiv, B., and A. Fedorikhin. 1999. Heart and mind in conflict: The interplay of affect and cognition in consumer decision making. *Journal of Consumer Research* 26 (3): 278-292.

Shiv, B., and A. Fedorikhin. 2002. Spontaneous versus controlled influences of stimulus-based affect on choice behavior. *Organizational Behavior and Human Decision Processes* 87 (2): 342-370.

Tan, H-T., Y. E. Wang, and B. Zhou. 2014. When the use of positive language backfires: The joint effect of tone, readability, and investor sophistication on earnings judgments. *Journal of Accounting Research* 52 (1): 273-302.

Tan, H-T., Y. E. Wang, and B. Zhou. 2015. How does readability influence investors' judgments? Consistency of benchmark performance matters. *The Accounting Review* 90 (1): 371-393.

Thaler, R. 1985. Mental accounting and consumer choice. *Marketing Science* 4 (3): 199-214.

Thaler, R. 1999. Mental accounting matters. *Journal of Behavioral Decision-making* 12 (3): 183-206.

Wojdynski, B. W. 2015. Interactive data graphics and information processing. *Journal of Media Psychology* 27: 11-21.

Xu, Q., and S. S. Sundar. 2016. Interactivity and memory: Information processing of interactive versus non-interactive content. *Computers in Human Behavior* 63: 620-629.

Zaichkowsky, J. L. 1985. Measuring the involvement construct. *Journal of Consumer Research* 12 (3): 341-352.

APPENDIX A: EXAMPLES OF INTERACTIVE AND NON-INTERACTIVE EARNINGS RELEASES

Example 1 (an Interactive Earnings Release): Excerpt of Microsoft 2018 Q1 Earnings Release

Earnings Release FY18 Q1

Productivity and Business Processes Intelligent Cloud More Personal Computing

Narrative Power BI

Productivity and Business Processes

Revenue increased $1.8 billion or 28%, driven by LinkedIn and higher revenue from Office.

• LinkedIn contributed revenue of $1.1 billion, primarily comprised of revenue from Talent Solutions.

• Office Commercial revenue increased $516 million or 10%, driven by higher revenue from Office 365 commercial, mainly due to growth in subscribers, offset in part by lower revenue from products licensed on-premises, reflecting a continued shift to Office 365 commercial.

• Office Consumer revenue increased $96 million or 12%, driven by higher revenue from Office 365 consumer, mainly due to growth in subscribers.

• Dynamics revenue increased 13%, primarily due to higher revenue from Dynamics 365.

Operating income increased $101 million or 3%, primarily due to higher gross margin, offset in part by higher operating expenses.

• Gross margin increased $1.2 billion or 25%, primarily due to LinkedIn and growth in Office. Gross margin percentage decreased due to an increased mix of cloud offerings and LinkedIn, offset in part by gross margin percentage improvements in Office 365 commercial. Cost of revenue included $411 million related to LinkedIn, including $218 million of amortization of acquired intangible assets.

• Operating expenses increased $1.1 billion or 54%, driven by LinkedIn expenses of $1.0 billion, including $154 million of amortization of acquired intangible assets.

Note: the three phrases in blue (i.e., “Productivity and Business Processes,” etc.) below the main title are clickable tabs that are linked to the financial performances pertaining to Microsoft’s three main business segments. This interface mirrors the interactive condition of our experimental case.

Example 2 (a Non-interactive Earnings Release): Excerpt of IBM 2017 Q3 Earnings Release

Segment Results for Third Quarter

- *Cognitive Solutions (includes solutions software and transaction processing software)* -- revenues of $4.4 billion, up 4 percent (up 3 percent adjusting for currency), driven by solutions software, including security and analytics, and transaction processing software.
- *Global Business Services (includes consulting, global process services and application management)* -- revenues of $4.1 billion, down 2 percent. Strategic imperatives revenue grew 10 percent led by the cloud practice.
- *Technology Services & Cloud Platforms* (*includes infrastructure services, technical support services and integration software)* -- revenues of $8.5 billion, down 3 percent (down 4 percent adjusting for currency). Strategic imperatives revenue grew 12 percent, driven by hybrid cloud services, security and mobile.
- *Systems (includes systems hardware and operating systems software)* -- revenues of $1.7 billion, up 10 percent, driven by growth in z Systems and storage.
- *Global Financing (includes financing and used equipment sales)* -- revenues of $427 million, up 4 percent (up 3 percent adjusting for currency).

APPENDIX B: EXPERIMENTAL MANIPULATIONS

B.1 Good-news Dispersed / Non-interactive / High Readability

Segment results:

- **Business A**

Region	**Change in earnings from year-ago quarter**
Region 1	↑ **Increased 11%**
Region 2	↓ Decreased 5%
Region 3	↓ Decreased 7%

- **Business B**

Region	**Change in earnings from year-ago quarter**
Region 1	↑ **Increased 8%**
Region 2	↓ Decreased 7%
Region 3	↓ Decreased 3%

- **Business C**

Region	**Change in earnings from year-ago quarter**
Region 1	↑ **Increased 16%**
Region 2	↓ Decreased 9%
Region 3	↓ Decreased 2%

B.2 Good-news Dispersed / Interactive / High Readability

	Segment Results		
Overall	Business A	Business B	Business C

Region	**Change in earnings from year-ago quarter**
Region 1	↑ **Increased 11%**
Region 2	↓ Decreased 5%
Region 3	↓ Decreased 7%

B.3 Good-news Condensed / Non-interactive / High Readability

Segment results:

- **Business A**

Region	**Change in earnings from year-ago quarter**
Region 1	↑ **Increased 11%**
Region 2	↑ **Increased 8%**
Region 3	↑ **Increased 16%**

- **Business B**

Region	**Change in earnings from year-ago quarter**
Region 1	↓ Decreased 5%
Region 2	↓ Decreased 7%
Region 3	↓ Decreased 9%

- **Business C**

Region	**Change in earnings from year-ago quarter**
Region 1	↓ Decreased 7%
Region 2	↓ Decreased 3%
Region 3	↓ Decreased 2%

B.4 Good-news Condensed / Interactive / High Readability

	Segment Results		
Overall	Business A	Business B	Business C

Region	**Change in earnings from year-ago quarter**
Region 1	↑ **Increased 11%**
Region 2	↑ **Increased 8%**
Region 3	↑ **Increased 16%**

B.5 Good-news Dispersed / Non-interactive / Low Readability

Segment results:

- **Business A**

The earnings generated by Business A **decreased by 11%** in Region 1 compared with year-ago quarter. Unlike Region 1, earnings from Business A increased by 5% in Region 2 and increased by 7% in Region 3 compared with year-ago quarter.

- **Business B**

The earnings generated by Business B **decreased by 8%** in Region 1 compared with year-ago quarter. Unlike Region 1, earnings from Business B increased by 7% in Region 2 and increased by 3% in Region 3 compared with year-ago quarter.

- **Business C**

The earnings generated by Business C **decreased by 16%** in Region 1 compared with year-ago quarter. Unlike Region 1, earnings from Business C increased by 9% in Region 2 and increased by 2% in Region 3 compared with year-ago quarter.

B.6 Good-news Dispersed / Interactive / Low Readability

	Segment Results		
Overall	Business A	Business B	Business C

The earnings generated by Business A **increased by 11%** in Region 1 compared with year-ago quarter. Unlike Region 1, earnings from Business A decreased by 5% in Region 2 and decreased by 7% in Region 3 compared with year-ago quarter.

B.7 Good-news Condensed / Non-interactive / Low Readability

Segment results:

- **Business A**

The earnings generated by Business A **increased by 11%** in Region 1 compared with year-ago quarter. Similarly, earnings from Business A **increased by 8%** in Region 2 and **increased by 16%** in Region 3 compared with year-ago quarter.

- **Business B**

The earnings generated by Business B decreased by 5% in Region 1 compared with year-ago quarter. Similarly, earnings from Business B decreased by 7% in Region 2 and decreased by 9% in Region 3 compared with year-ago quarter.

- **Business C**

The earnings generated by Business C decreased by 7% in Region 1 compared with year-ago quarter. Similarly, earnings from Business C decreased by 3% in Region 2 and decreased by 2% in Region 3 compared with year-ago quarter.

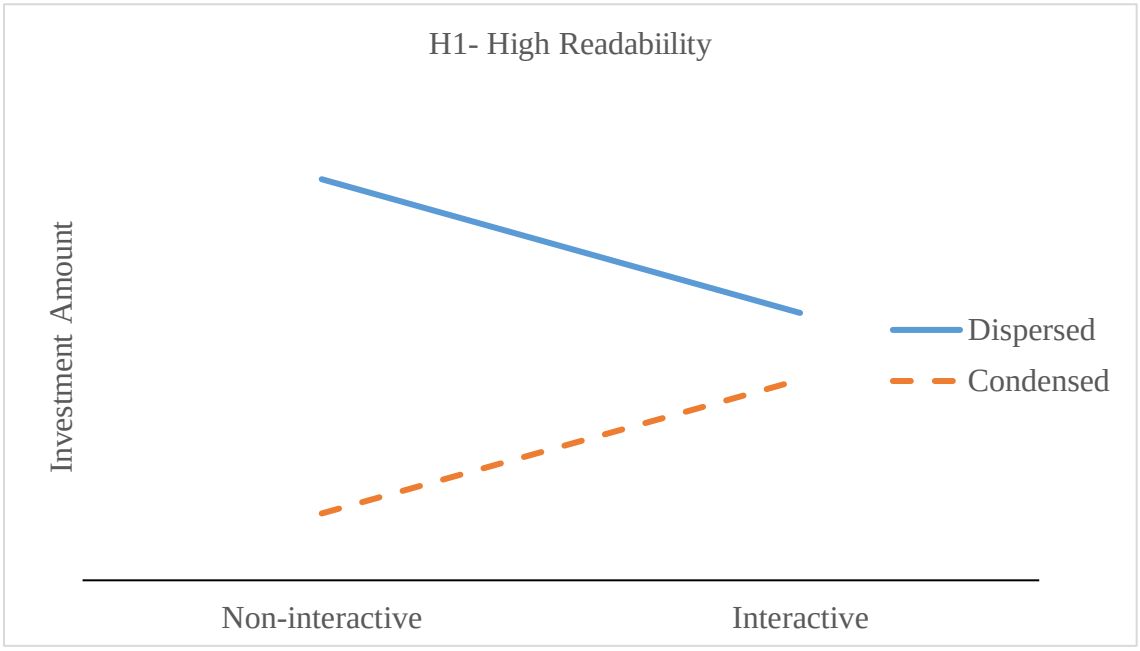
B.8 Good-news Condensed / Interactive / Low Readability

	Segment Results		
Overall	Business A	Business B	Business C

The earnings generated by Business A **increased by 11%** in Region 1 compared with year-ago quarter. Similarly, earnings from Business A **increased by 8%** in Region 2 and **increased by 16%** in Region 3 compared with year-ago quarter.

FIGURE 1

Panel A: Theoretical Prediction of H1



Panel B: Theoretical Prediction of H2

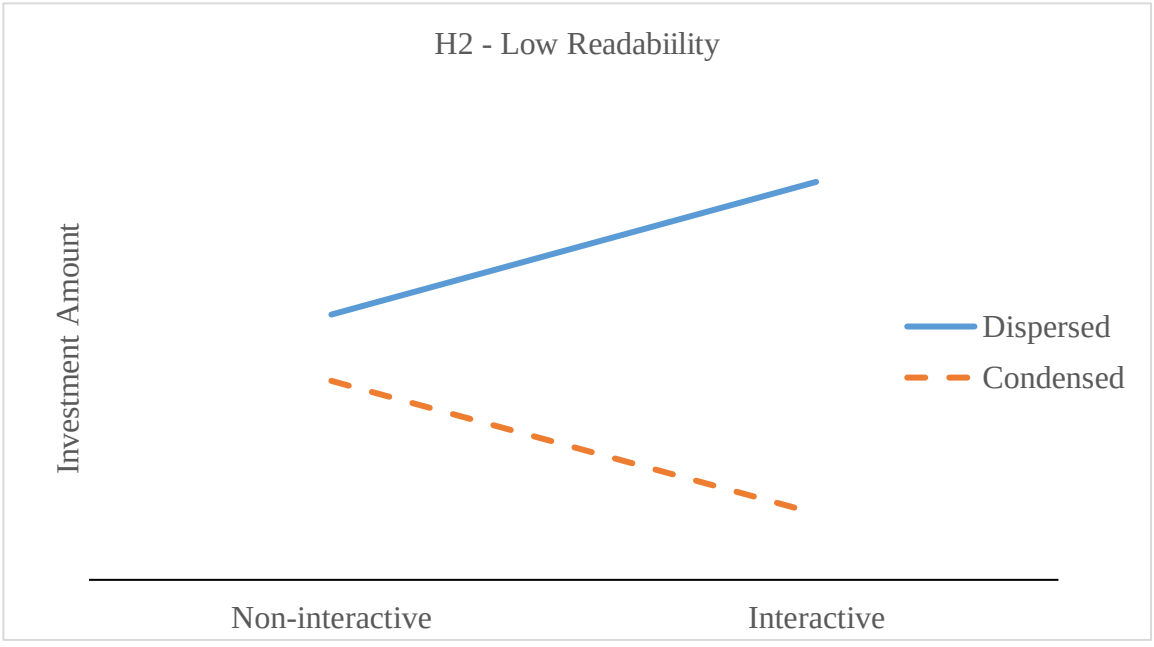


Figure 1 presents our predictions on investment amount. Narrative structure (good-news "dispersed" versus good-news "condensed") and medium interactivity (interactive versus non-interactive) are the independent variables. Panel A shows the prediction of H1 where readability is high, whereas Panel B shows the prediction of H2 where readability is low.

FIGURE 2
Results of High-readability Condition (Test of H1)

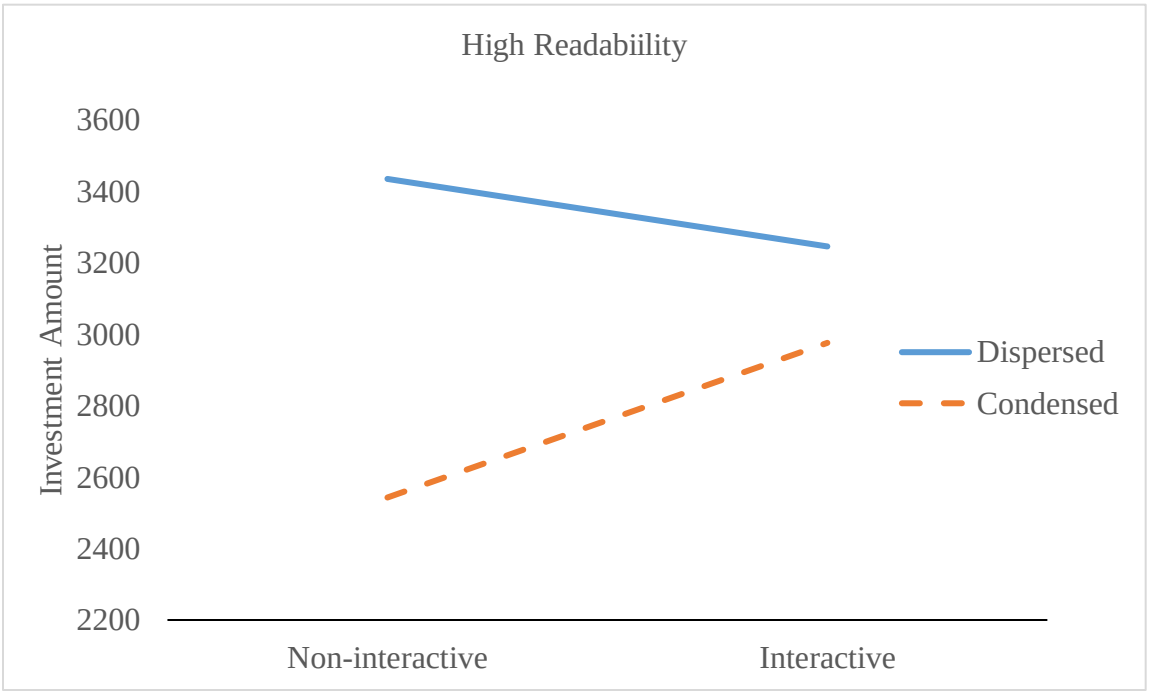


Figure 2 presents the results of the high-readability condition. Narrative structure (good-news "dispersed" versus good-news "condensed") and medium interactivity (interactive versus non-interactive) are the independent variables. Investment amount (out of $10000) is the dependent variable.

FIGURE 3
Results of Low-readability Condition (Test of H2)

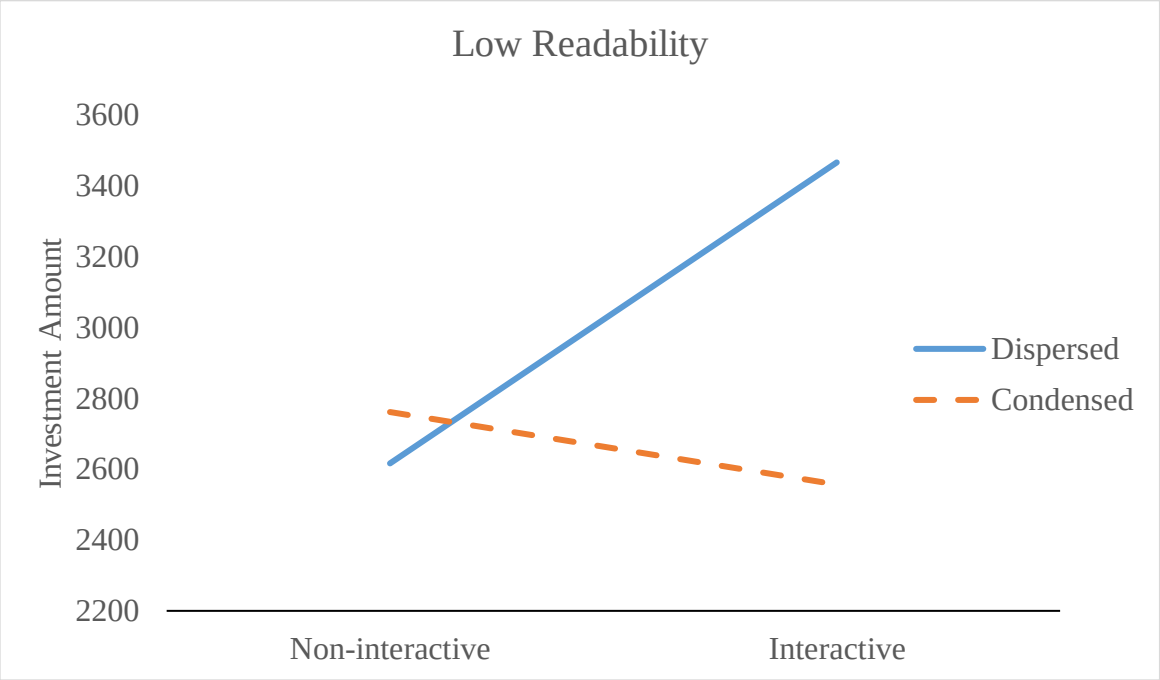


Figure 3 presents the results of the low-readability condition. Narrative structure (good-news "dispersed" versus good-news "condensed") and medium interactivity (interactive versus non-interactive) are the independent variables. Investment amount (out of $10000) is the dependent variable.

FIGURE 4
Results of Reading Time

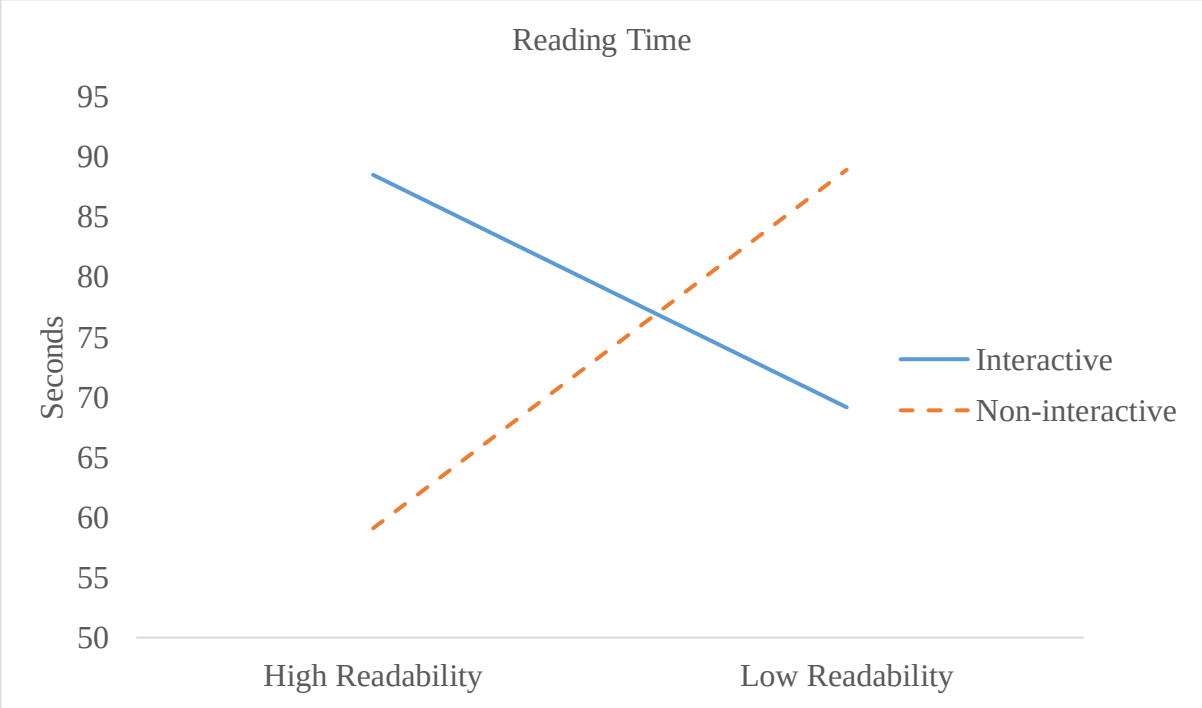


Figure 4 presents the results of the time participants spend on reading the earnings release. Readability (high versus low) and medium interactivity (interactive versus non-interactive) are the independent variables. The number of seconds participants spend on reading the earnings release is the dependent variable.

TABLE 1

Results of All Conditions

Panel A: Descriptive Statistics for Investment Amount (Mean, SD, Sample Size)

	Readability				
	High		Low		
	Interactive	Non-interactive	Interactive	Non-interactive	Overall
Good-news dispersed	3111.605 (2141.285) n = 38	3306.758 (2249.722) n = 33	3380.735 (2490.126) n = 34	2394.069 (2005.958) n = 29	3072.664 (2240.012) n = 134
Good-news condensed	3151.765 (2365.243) n = 34	2403.107 (1850.515) n = 28	2491.424 (2205.700) n = 33	2820.263 (2311.184) n = 38	2735.594 (2204.711) n = 133
Overall	3021.135 (2172.417) n = 133		2789.254 (2277.714) n = 134		

Panel B: Three-way ANOVA Tests

Source	**S. S.**	***df***	**M. S.**	**F**	**p-value**
Narrative structure	7264514.843	1	7264514.843	1.471	0.226
Interactivity	6056871.310	1	6056871.310	1.226	0.269
Readability	3245764.866	1	3245764.866	0.657	0.418
Narrative structure×Interactivity	570290.043	1	570290.043	0.115	0.734
Narrative structure×Readability	661688.380	1	661688.380	0.134	0.715
Interactivity×Readability	44923.611	1	44923.611	0.009	0.924
Narrative structure ×Interactivity×Readability	21070512.907	1	21070512.907	4.266	0.020*
Error	1279296091.845	259	1279296091.845		

* One-tailed equivalent.

TABLE 2

Results of High-readability Condition (Test of H1)

Panel A: Descriptive Statistics for Investment Amount (Mean, SD, Sample Size)

	Interactivity		
Narrative structure	Interactive	Non-interactive	Overall
Good-news dispersed	3246.175	3435.342	3338.333
	(2173.784)	(2227.970)	(2188.067)
	n = 40	n = 38	n = 78
Good-news condensed	2976.200	2543.026	2762.354
	(2296.874)	(2283.027)	(2285.739)
	n = 40	n = 39	n = 79
Overall	3111.188	2983.390	
	(2226.127)	(2285.686)	
	n = 80	n = 77	

Panel B: Contrast-coded ANOVA Tests [a]

Source	**S. S.**	***df***	**F**	**p-value**
Contrast	16777768.900	1	3.326	0.035*
Residual between-cells variance	645586.6329	2	0.064	0.938
Error	771764419.700	154		

Panel C: Simple Main Effects

Source	***df***	**F**	**p-value**
Effect of narrative structure when interactive	1	0.289	0.592
Effect of narrative structure when non-interactive	1	3.038	0.042*

[a] Contrast weights: −3: good-news-condensed / non-interactive condition; -1: good-news-condensed / interactive condition; +1: good-news-dispersed / interactive condition; +3: good-news-dispersed / non-interactive condition.

* One-tailed or one-tailed equivalent.

TABLE 3

Results of Low-readability Condition (Test of H2)

Panel A: Descriptive Statistics for Investment Amount (Mean, SD, Sample Size)

	Interactivity		
Narrative structure	Interactive	Non-interactive	Overall
Good-news dispersed	3465.775	2616.282	3046.405
	(2446.111)	(2102.459)	(2308.228)
	n = 40	n = 39	n = 79
Good-news condensed	2556.568	2761.268	2664.167
	(2186.876)	(2244.945)	(2205.582)
	n = 37	n = 41	n = 78
Overall	3028.883	2690.588	
	(2354.758)	(2164.103)	
	n = 77	n = 80	

Panel B: Contrast-coded ANOVA Tests [a]

Source	**S. S.**	***df***	**F**	**p-value**
Contrast	13548394.009	1	2.666	0.052*
Residual between-cells variance	7915964.149	2	0.779	0.461
Error	782529106.430	154		

Panel C: Simple Main Effects

Source	***df***	**F**	**p-value**
Effect of narrative structure when interactive	1	3.136	0.040*
Effect of narrative structure when non-interactive	1	0.083	0.774

[a] Contrast weights: −3: good-news-condensed / interactive condition; -1: good-news-condensed / non-interactive condition; +1: good-news-dispersed / non-interactive condition; +3: good-news-dispersed / interactive condition.

* One-tailed or one-tailed equivalent.

TABLE 4
Reading Time

Panel A: Descriptive Statistics for Seconds Spent (Mean, SD, Sample Size)

	Readability		
Interactivity	High	Low	Overall
Interactive	88.513	69.166	78.840
	(130.330)	(56.316)	(101.198)
	n = 80	n = 77	n = 157
Non-interactive	59.100	88.942	73.021
	(46.137)	(149.579)	(111.923)
	n = 77	n = 79	n = 156
Overall	73.807	78.054	
	(99.280)	(113.634)	
	n = 157	n = 156	

Panel B: Two-way ANOVA Tests

Source	**S. S.**	***df***	**M. S.**	**F**	**p-value**
Readability	2153.692	1	2153.692	0.191	0.663
Interactivity	1816.365	1	1816.365	0.161	0.689
Readability×Interactivity	47320.220	1	47320.220	4.097	0.042
Error	3489858.060	309	11294.039		

Panel C: Simple Main Effects

Source	***df***	**F**	**p-value**
Effect of interactivity when readability is high	1	3.006	0.042*
Effect of interactivity when readability is low	1	1.350	0.136*
Effect of readability when interactive	1	1.300	0.128*
Effect of readability when non-interactive	1	3.075	0.040*

* One-tailed.